

REMARKS

The Office Action dated July 14, 2004 has been carefully considered. Claims 8 and 14 have been amended. Claim 15 has been added. Claims 11-13 have been cancelled. Claims 8-10, 14 and 15 are in this application. Support for new claim 15 is found throughout the specification and in particular on page 12, lines 23-24 and page 13, lines 8-9. No new matter has been entered.

The drawings are objected to as failing to include reference numerals mentioned in the specification. Applicants submit herewith Replacements Sheets 1 and 2 amending Figs. 2 and 3 to include the corresponding reference numerals mentioned in the specification.

The previously presented claims 8-10 and 14 were rejected under 35 U.S.C. § 103 as obvious in view of admitted prior art shown in Fig. 1 and as described on page 1, line 15 through page 5 line 29 of the present specification in combination with U.S. Patent No. 4,769,998 to Oswalt et al. Applicants submit that the teachings of these references do not teach or suggest the invention defined by the present claims.

The invention defined by amended claim 8 has an essential feature that an apparatus for the production of acrylic acid or acrolein comprises a catalytic gas phase oxidation reactor, an evaporator for gasifying liquefied propylene and/or propane as raw material of acrylic acid or acrolein, and heat exchangers attached to the apparatus, the heat exchangers are at least one member selected from the group consisting of an absorbing solvent cooler and a circulation cooler attached to the acrylic acid absorbing column, a condenser attached to the solvent separating column, and a condenser attached to the acrylic acid refining column and to recover the latent heat of gasifying liquefied propylene and/or propane to use a liquefied coolant.

Applicants' admitted prior art describes that liquefied propylene is gasified through a propylene evaporator. It has been heretofore customary to supply steam 17 controlled by the pressure controller 24 to the evaporator 3 for the purpose of utilizing the high energy of the steam 17, thereby gasifying liquefied propylene. The condensed drain of the steam 17 resulting from the heat exchange has been utilized as the boiler feed water for the purpose of harnessing the sensible heat thereof. Heretofore, the problem of the polymer formation due to the supply of the steam 17 thereto has been coped with only by periodic removal of the polymer deposited

thereon. As noted by the Examiner, Applicants' admitted prior art does not disclose substituting a liquid coolant for steam 17 supplied as the heat source and preparing a chilled coolant.

As described on page 5, line 35 to page 6, line 6 of the present specification, by substituting the liquid coolant for the steam supplied as the heat source for gasifying liquefied propylene in the propylene evaporator, it is made possible to recover the latent heat produced during the gasification, and further to allow the reactant gas to be supplied stably and, at the same time, enable the total system for producing acrylic acid to be stabilized drastically, thereby reducing the polymerization and clogging. Further the present invention allows the electric power heretofore required for the cooler to be decreased by utilizing the chilled coolant obtained recovering latent heat during the gasification mentioned above.

Oswalt et al. disclose that a mechanically refrigerated chiller system for a process coolant has a process cooling fluid circuit which includes a coolant reservoir with refrigerant evaporator coils in it. The process heated coolant is returned through a tank having an evaporating heat exchanger of a refrigeration system. If a sensed temperature of the returned coolant is below a desired point heat is transferred from a hot gas to in the refrigeration system to a portion of the coolant returned to the tank.

In contrast to the invention defined by the present claims, Oswalt et al. do not teach or suggest an evaporator for gasifying liquefied propylene and/or propane as raw material of acrylic acid or acrolein and recovering latent heat of the liquefied propylene and/or propane for use in chilling the coolant in the evaporator. Rather, Oswalt et al. teach use of a hot-gas path. Applicants submit that propylene and/or propane cannot be used for recovering the latent heat in the system, because propylene and/or propane has a possibility to explode when it is mixed with air in the specific ratio.

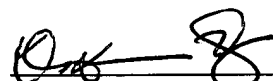
Furthermore, there is no teaching or suggestion in Oswalt et al. of the problem of the polymer formation due to the supply of the steam and substituting the liquid coolant for the steam supplied to the heat source for gasifying propylene in a propylene evaporator. Applicants submit that there is no motivation for one of ordinary skill in the art to combine the Oswalt et al. with Applicants admitted prior art chilling system for a process coolant which does not teach how to gasify propylene and/or propane or that the gasifying liquefied propylene and/or propane

is subjected to a catalytic gas phase oxidation in order to produce acrylic acid or acrolein. Further, even if the references were combined the combination would not disclose the present invention since neither reference teaches means for chilling the coolant by recovering latent heat of the liquefied propylene and/or propane as well as means for circulation of coolant which recover the latent heat of the liquefied propylene and/or propane from the evaporator to heat exchangers. The present invention teaches that a catalytic gas phase oxidation reactor has the advantage that the latent heat absorbed in the coolant is used in the apparatus effectively. Furthermore, the present invention can stabilize drastically the total system for producing acrylic acid or acrolein and the electric power required for the cooler is decreased by recovering the latent heat of the raw material gas. There is no teaching or suggestion of this advantage in either Applicants' admitted prior art or Oswalt et al. Accordingly, the invention defined by the present claims is not obvious in view of Applicants' admitted prior art alone or in combination with Oswalt et al.

In view of the foregoing, Applicants submit that all pending claims are in condition for allowance and request that all claims be allowed. The Examiner is invited to contact the undersigned should she believe that this would expedite prosecution of this application. It is believed that no fee is required. The Commissioner is authorized to charge any deficiency or credit any overpayment to Deposit Account No. 13-2165.

Respectfully submitted,

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